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1014 R-1 PCT/PTO 12 3 AUG 2001 # PC-

FORM PTO-1390  
(REV 12-29-99)

U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

ATTORNEY'S DOCKET NUMBER

TRANSMITTAL LETTER TO THE UNITED STATES  
DESIGNATED/ELECTED OFFICE (DO/EO/US)  
CONCERNING A FILING UNDER 35 U.S.C. 371

PS-13256

U.S. APPLICATION NO. (If known, see 37 CFR 1.5)

09/914326

INTERNATIONAL APPLICATION NO.  
PCT/EP00/01998INTERNATIONAL FILING DATE  
March 8, 2000PRIORITY DATE CLAIMED  
March 9, 1999TITLE OF INVENTION  
METHOD OF HOT-REPAIRING THE HEATING FLUES OF A COKE-OVEN  
BATTERY AND DEVICE FOR CARRYING OUT SAID METHOD

APPLICANT(S) FOR DO/EO/US

Werner Hippe and Hans-Juergen Fischer

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☐ This express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(1).
4. ☒ A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.
5. ☒ A copy of the International Application as filed (35 U.S.C. 371(c)(2))
  - a. ☐ is transmitted herewith (required only if not transmitted by the International Bureau).
  - b. ☒ has been transmitted by the International Bureau.
  - c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
6. ☒ A translation of the International Application into English (35 U.S.C. 371(c)(2)).
7. ☒ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3))
  - a. ☐ are transmitted herewith (required only if not transmitted by the International Bureau).
  - b. ☐ have been transmitted by the International Bureau.
  - c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
  - d. ☒ have not been made and will not be made.
8. ☐ A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
9. ☒ An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).
10. ☒ A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

## Items 11. to 16. below concern document(s) or information included:

11. ☒ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
12. ☐ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
13. ☐ A **FIRST** preliminary amendment.  
☐ A **SECOND** or **SUBSEQUENT** preliminary amendment.
14. ☐ A substitute specification.
15. ☐ A change of power of attorney and/or address letter.
16. ☒ Other items or information:  
Copy of International Search Report dated June 28, 2000  
Copy of International Preliminary Examination Report dated June 27, 2001  
Three (3) sheets of drawings  
Cover sheet of WO 00/53694  
Notification of the recording of a change (Form PCT/IB/306)

"Express Mail" mailing label number EF210517309 US

U.S. APPLICATION NO. (if known, see 37 CFR 1.53)		INTERNATIONAL APPLICATION NO.		ATTORNEY'S DOCKET NUMBER	
09/914326		PCT/EP00/01998		PS-13256	
17. <input checked="" type="checkbox"/> The following fees are submitted: <b>BASIC NATIONAL FEE (37 CFR 1.492 (a) (1) - (5)) :</b> Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO ..... \$1000.00 International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO ..... \$ 860.00 International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO ..... \$ 710.00 International preliminary examination fee paid to USPTO (37 CFR 1.482) but all claims did not satisfy provisions of PCT Article 33(1)-(4) ..... \$ 690.00 International preliminary examination fee paid to USPTO (37 CFR 1.482) and all claims satisfied provisions of PCT Article 33(1)-(4) ..... \$ 100.00 <div style="text-align: right; margin-top: 10px;"><b>ENTER APPROPRIATE BASIC FEE AMOUNT =</b></div>				CALCULATIONS      PTO USE ONLY	
Surcharge of \$130.00 for furnishing the oath or declaration later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(e)).				\$	
CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE		
Total claims	9 - 20 =	0	X \$ 18.00	\$	0 00
Independent claims	1 - 3 =	0	X \$ 80.00	\$	0 00
MULTIPLE DEPENDENT CLAIM(S) (if applicable)			+ \$260.00	\$	
<b>TOTAL OF ABOVE CALCULATIONS =</b>				\$	860 00
Reduction of 1/2 for filing by small entity, if applicable. A Small Entity Statement must also be filed (Note 37 CFR 1.9, 1.27, 1.28).				\$	
<b>SUBTOTAL =</b>				\$	860 00
Processing fee of \$130.00 for furnishing the English translation later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(f)).				\$	
<b>TOTAL NATIONAL FEE =</b>				\$	860 00
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). \$40.00 per property				\$	
<b>TOTAL FEES ENCLOSED =</b>				\$	860 00
				Amount to be refunded:	\$
				charged:	\$
a. <input checked="" type="checkbox"/> A check in the amount of \$ <u>860.00</u> to cover the above fees is enclosed.  b. <input type="checkbox"/> Please charge my Deposit Account No. _____ in the amount of \$ _____ to cover the above fees. A duplicate copy of this sheet is enclosed. c. <input checked="" type="checkbox"/> The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. <u>22-0347</u> . A duplicate copy of this sheet is enclosed.					
<b>NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.</b>					
SEND ALL CORRESPONDENCE TO: ROBERT V. VICKERS VICKERS, DANIELS & YOUNG 50 Public Square Suite 2000 Cleveland, Ohio 44113 (216) 623-0040			<div style="text-align: right;">           SIGNATURE:          ROBERT V. VICKERS          NAME          19,504          REGISTRATION NUMBER       </div>		

09/914326

JC03 Rec'd PCT/TO 23 AUG 2001

**PATENT**

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re Application of : Werner Hippe and Hans-Juergen Fischer  
For : METHOD OF HOT-REPAIRING THE  
HEATING FLUES OF A COKE-OVEN  
BATTERY AND DEVICE FOR CARRYING  
OUT SAID METHOD  
International Application No. : PCT/EP00/01998  
International Filing Date : March 8, 2000  
Priority Application No. : 199 10 300.3  
Priority Filing Date : March 9, 1999  
Our Docket : PS-13256

"Express Mail" mailing label number EF-212617509 US

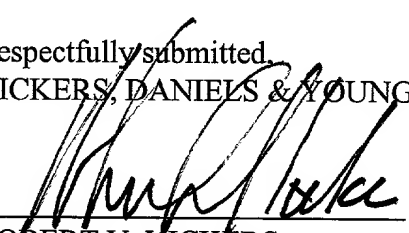
**ENGLISH TRANSLATION**

Asst. Commissioner for Patents  
Washington, D.C. 20231

Dear Sir:

Enclosed herewith is a literal English translation of the as filed application PCT/EP00/01988  
filed on March 8, 2000.

Respectfully submitted,  
VICKERS, DANIELS & YOUNG

By:   
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METHOD FOR HOT-REPAIRING THE HEATING FLUES OF A COKE-OVEN  
BATTERY AND DEVICE FOR CARRYING OUT SAID METHOD

The invention pertains to a method and a device for hot repair of heating flues of a coke-oven battery according to the preamble of Claim 1 and Claim 5 respectively.

5 It is known from EP 0 421 174 B1 that even during the construction of the heating flues, the already completed sections of each heating flue are heated to a temperature of approximately 250° C by means of heated air. The air is injected through a heating tube (calorifier) by means of a compressor into the heating flues and the air exits the flues through a chimney at the upper completed end. The heating of the air required by the method is done through indirect heat exchange with the hot parts of the coke-oven battery. The heating tube is installed either above the regenerator grating in the regenerator of the coke oven or on the oven bottom.

15 This method is associated with high installation expense for tube and pipeline material. In addition, an air compressor must be installed in order to force the air through the tube paths and the heating flues. The technical effort according to the method for heating the newly constructed heating flues is very high in comparison with the short heating time required.

20 The problem of the invention is based on improving the heating of the heating flues to the effect that satisfactory heating properties are achieved with simpler technology.

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The problem is solved with respect to the method by the features of Claim 1 and with respect to the device by the features of Claim 6.

Refinements are listed in the subordinate claims.

5

According to the invention, during the construction of the heating flues, the already completed sections of each heating flue are heated to a temperature of, e. g., approximately 250° C, by means of completely normal combustion air that is preheated by the regenerator of the coke oven, wherein the flow paths in the coke-oven battery for combustion air and exhaust gas are used by the regenerator. For this purpose, an air reversing device that follows the construction progress is installed in the flow path for ovens with twin heating flues. This air reversing device comprises, first, known cover plates that restrict the falling down of mortar, dirt, or anything else into the heating flue during construction, and second, at least one air passage tube that circumvents the frame wall between at least two heating flues, that penetrates the cover plates in the region of its open ends, and that fluidly connects at least two heating flues. In an air passage tube, a slide valve is preferably installed for regulating the throughput of the combustion air.

20

During construction, the already constructed parts of the heating flues are supplied with preheated air by the regenerator of the coke oven. This air is pushed upwards through the already constructed heating flue part and then pushed downwards through the heating flue part and back towards the regenerator via the air reversing device. From the regenerator, the air is pushed into the chimney by means of the exhaust gas channel and then ejected into the atmosphere.

25

The combustion gas supply to the heating flues being repaired remains uninterrupted, so that over the flow path of the heating media (air and gas) of a heating flue, merely the combustion gas flows through the regenerator, a certain amount of heat is received, and this heat is dissipated again at the newly erected heating flues to be heated. The combustion air is used as a heat carrier medium. In this way, a simple and energy-efficient heating of the newly constructed wall is achieved.

35

The air reversing device is set incrementally higher with the progress of the work on the wall, so that the newly constructed parts of the heating flue are correspondingly heated. In this respect, the air reversing device is designed so that 4-6 sections (layers of bricks) can be worked on at one time.

5

The regulation of the combustion air flow rate is done with the regulation element that is already provided on the coke oven. Precise regulation of the combustion air flow rate and thus the temperature in the already completed sections of the heating flues to be repaired is done, e. g., by means of a slide valve in the air reversing device. The temperature is controlled by temperature measurement points that are arranged, in particular, below of the air reversing device.

10

The cost for heating the heating flues is reduced by this simple method. That is, repair according to this method is considerably more cost effective.

15

The aforementioned steps of the method and components, as well as those claimed and described in the embodiment, and which are to be used according to the invention, have no special requirements relative to the method, size, shape, material selection, and technical design, so that the known selection criteria in each field of application can be used without restriction.

20

Additional details, features, and advantages of the object of the invention result from the following description of the associated drawing which shows preferred embodiments as examples. Shown in the drawing are:

25

Figure 1 a vertical section through several twin heating flue pairs, in which two air reversing devices are arranged, in schematic representation;

30

Figure 2 a vertical section through several heating flue pairs, in which a second configuration of the air reversing device is arranged, which can heat three heating flues, in the same representation as in Figure 1;

Figure 3A a cross-sectional enlargement through an air reversing device from Figure 1 (cut along the line III A-III A according to Figure 3B); and

- 5 Figure 3B this same air reversing device in top view (cut along the line III B-III 3B according to Figure 3A).

Figure 1 shows a section through two heating flue pairs 1 and 2 to be repaired. Corresponding air reversing devices 3, with air passage tubes 4 and 4', are arranged in heating flue pairs 1 and 2. The air passage tubes 4 and 4' are connected in a gas-tight manner at their lower ends to cover plates 17, 17' that separate the constructed part of the heating flues 1 and 2 from the part still to be constructed. The air passage tubes 4' are each provided with a slide valve 5, with which the amount of air can be regulated for adjusting the desired temperature of approximately 250° C below the air reversing device 3. The temperature below the air reversing device is measured with thermo elements 6.

The flow path of the combustion air is shown by arrows. According to the arrow 7 (Figures 1 and 2), the combustion air flows into the regenerator bottom channel 23, flows through the regenerator 8, and enters at the combustion level 9 into the heating flue pair 1 to be repaired. The combustion air then flows through the air reversing tubes 4 and 4' and downwards through the heating flue 1, via the combustion level 10 and into a neighbouring regenerator 11, and there it exits according to the arrow 12 to the chimney through the regenerator bottom channel 23.

The flow rate of the combustion air is determined by the chimney draft, as well as by the adjustment of the regulating valves of the coke oven, which are not shown in Figure 1. Additional regulation of the combustion air throughput is carried out with the slide valve 5 of the air reversing device 3.

Figure 2 shows a perpendicular section through three newly constructed heating flues 14, 15, and 16. In this case, the air reversing device 3 comprises more parts. The air passage tubes 4, 4', and 4'' are inserted into an intermediate part 13. In this case, the air passage tubes 4'' and 4' are each provided with a slide valve 5. The remaining reference numbers have the same meaning as

in Figure 1. The combustion air flows through the middle heating flue 14 upwards through the air reversing device 3, is distributed downwards through the heating flues 15 and 16, and again flows over the regenerator 8 to the corresponding exhaust gas valves in the coke oven. After the reversal of the regenerator, the combustion air flows in the heating flues 15 and 16 upwards according to the arrows within the parentheses, is drawn by suction by the heating flue 14, and flows through the regenerator 8 to the corresponding exhaust gas valve of the coke oven.

10 The exact arrangement of the air reversing device 3 in the heating flues that are to be repaired and that comprise the frame walls 19 and the sliding walls 24 can be seen in Figures 3 A/B. The air reversing device comprises the air passage tubes 4 and 4' that are connected in a gas-tight manner to the cover plates 17, 17', where the air passage tubes 4 and 4' are set together with their horizontal ends and locked at each joint of the heating flue walls with the help of at least one locking mechanism 18 that is arranged on the cover plate 17, 17'. Thus, during further construction, the air reversing device 3 can be moved quickly. The air passage tubes 4 and 4' are designed such that 4-6 sections of the frame walls 19 and the sliding walls 24 can be worked on at one time.

20 For protection of the walls against heat and for better insulation of the air reversing device 3, the air reversing device is covered with, e. g., fibrous insulation 20. The cover plates 17 should also be lined with fibrous insulation 21 on their bottom side. In this way, also the seal to the frame walls 19 and the sliding walls (24) is improved. The flow of the air through reversing device 3 is shown by the arrows 22, and the direction changes according to the heating reversal of the coke-oven battery and the corresponding reversal period after approximately 20 min.



List of reference numbers

	1	Heating flue pair
5	2	Heating flue pair
	3	Air reversing device
	4	Air passage tube
	4'	Air passage tube
	4"	Air passage tube
10	5	Sliding valves
	6	Thermo element
	7	Arrow
	8	Regenerator
	9	Combustion level
15	10	Combustion level
	11	Neighbouring regenerator
	12	Arrow
	13	Intermediate part
	14	Heating flue
20	15	Heating flue
	16	Heating flue
	17	Cover plate
	18	Locking mechanism
	19	Frame wall
25	20	Insulation
	21	Insulation
	22	Arrow
	23	Regenerator bottom channel
	24	Sliding wall
30		

Claims

1. Method for hot repair of pairwise or groupwise used heating flues of a coke-oven battery, with which even during the construction of the heating flues, the already completed sections of each heating flue are heated by means of heated gas, characterized in that air that is normally present in the heating flues in the coking operation for combustion is used as heated gas, and in that this air is guided through flow paths in the coke-oven battery for the combustion air and the exhaust gas, including through the regenerator, and in this way is heated and subsequently guided through the heating flues to be repaired, wherein the completed part of the heating flue is separated from the part of the heating flue still to be constructed by an air reversing device.
2. Method according to Claim 1, characterized in that the position of the air reversing device is moved incrementally upwards with the progress of the work on the wall.
3. Method according to Claims 1 and 2, characterized in that the regulation of the combustion air throughput is done in the air reversing device.
4. Method according to Claim 3, characterized in that the regulation of the combustion air throughput is done by a sliding valve.
5. Method according to one of Claims 1-4, characterized in that the control of the temperature in the region of the air reversing device is done by at least one temperature measurement point.
6. Device for carrying out the method according to Claims 1-5, comprising an air reversing device (3) with air passage tubes (4, 4', 4'') that are each connected to a cover plate (17) which separates the completed parts of at least two pairwise or groupwise used heating flues from the parts still to be constructed.

7. Device according to Claim 6, characterized in that the air reversing device (3) is provided with a sliding valve (5) for regulating the amount of air.
- 5 8. Device according to Claim 6 or 7, characterized by at least one temperature measurement point for controlling the temperature in the region of the air reversing device.
- 10 9. Device according to one of Claims 6-8, characterized in that the air reversing device (3) features an intermediate part (13) that is connected to the air passage tubes (4, 4', 4'').

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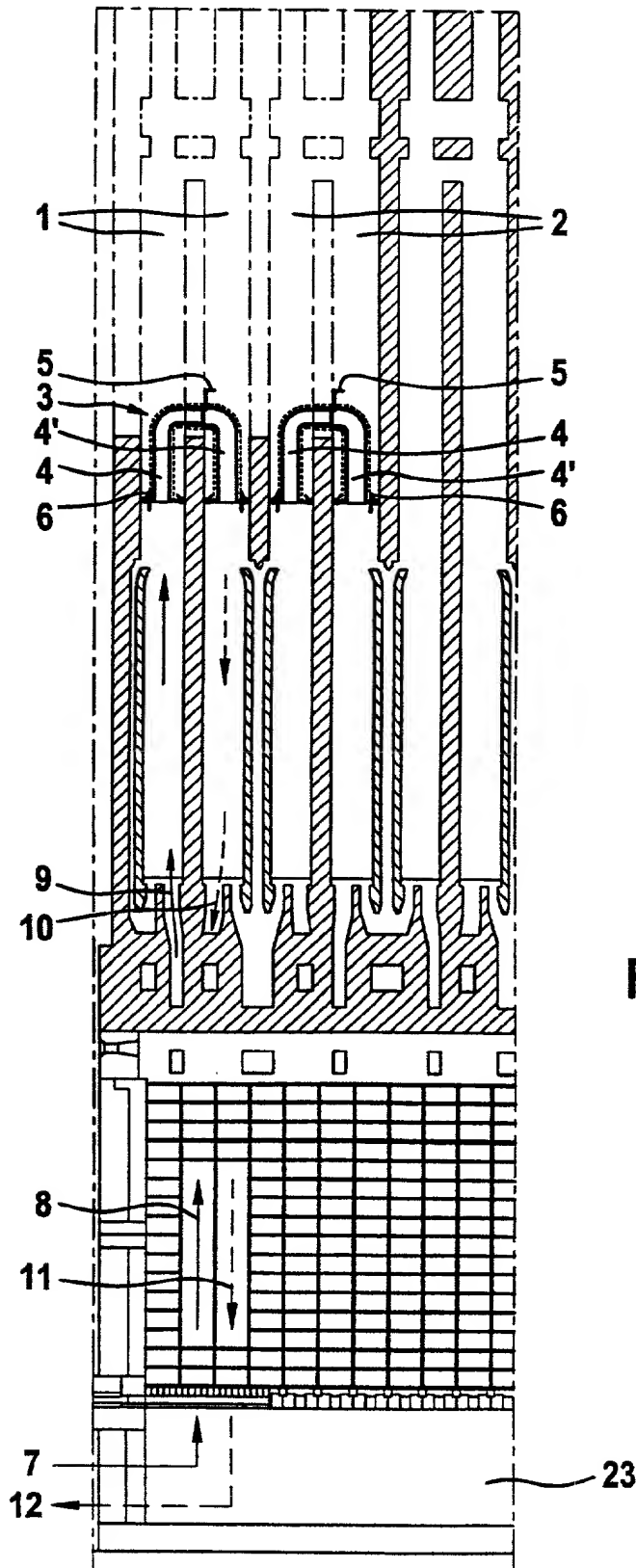


Fig. 1

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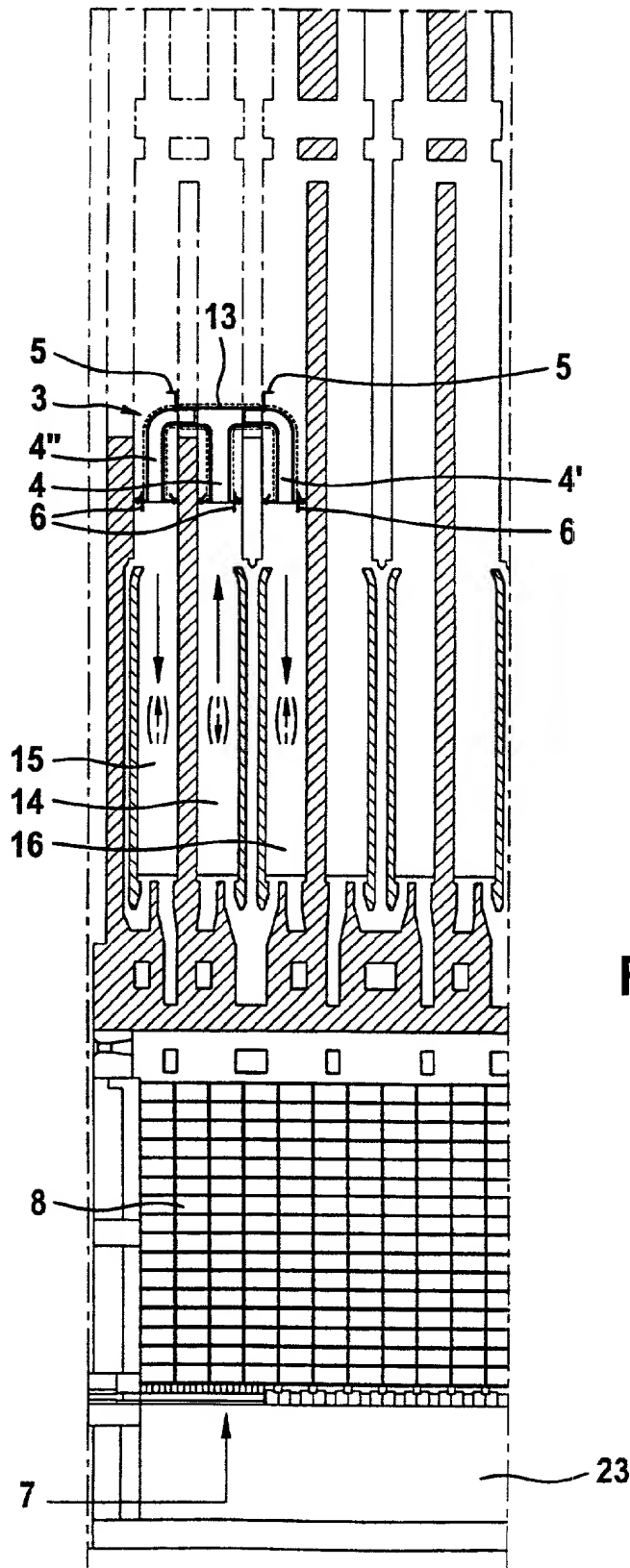
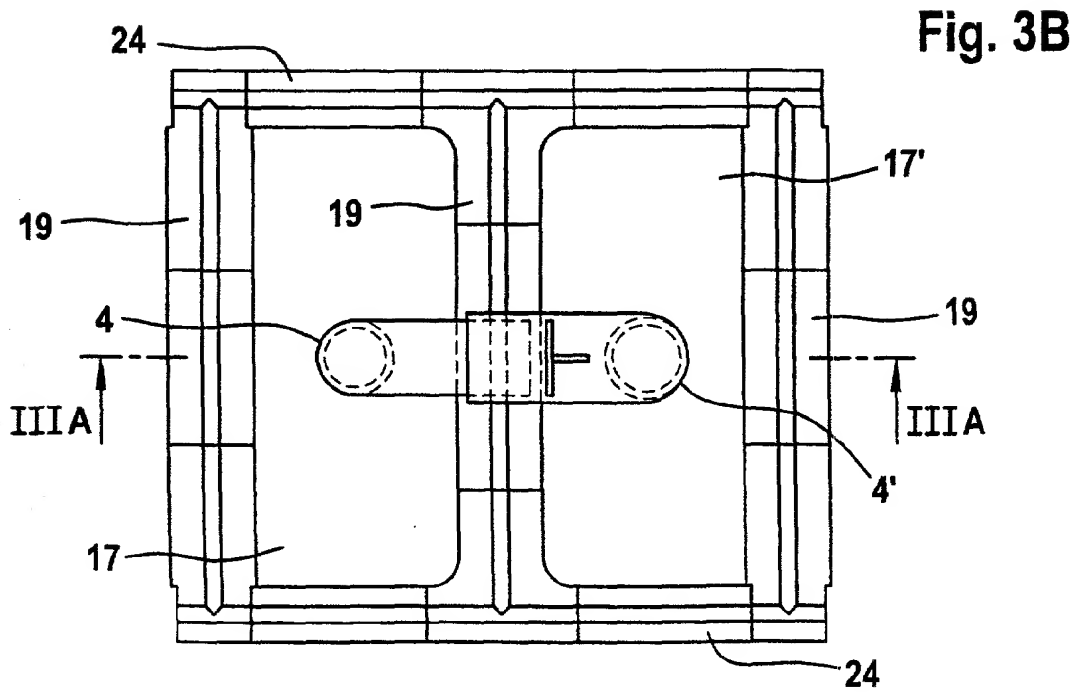
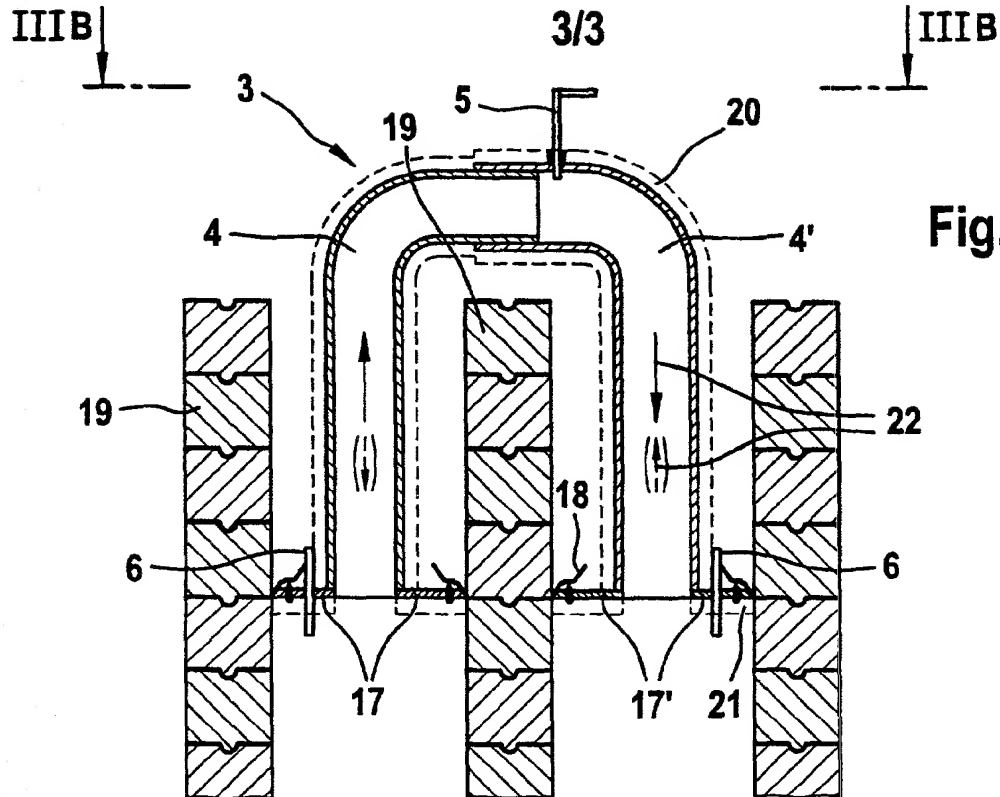


Fig. 2



**PATENT**

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re Application of : Werner Hippe and Hans-Juergen Fischer

For : METHOD OF HOT-REPAIRING THE  
HEATING FLUES OF A COKE-OVEN  
BATTERY AND DEVICE FOR CARRYING  
OUT SAID METHOD

International Application No. : PCT/EP00/01998

International Filing Date : March 8, 2000

Priority Application No. : 199 10 300.3

Priority Filing Date : March 9, 1999

Our Docket : PS-13256

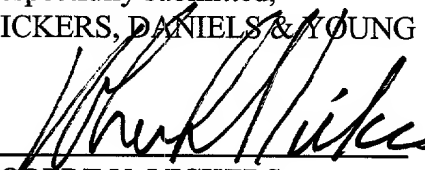
**SUBMISSION OF DRAWINGS**

Asst. Commissioner for Patents  
Washington, D.C. 20231

Dear Sir:

Please substitute the enclosed three (3) sheets of drawings for the drawings presently on file  
in the above-identified patent application.

Respectfully submitted,  
VICKERS, DANIELS & YOUNG

By:   
ROBERT V. VICKERS  
Reg. No. 19,504  
VICKERS, DANIELS & YOUNG  
50 Public Square, Suite 2000  
Cleveland, Ohio 44113  
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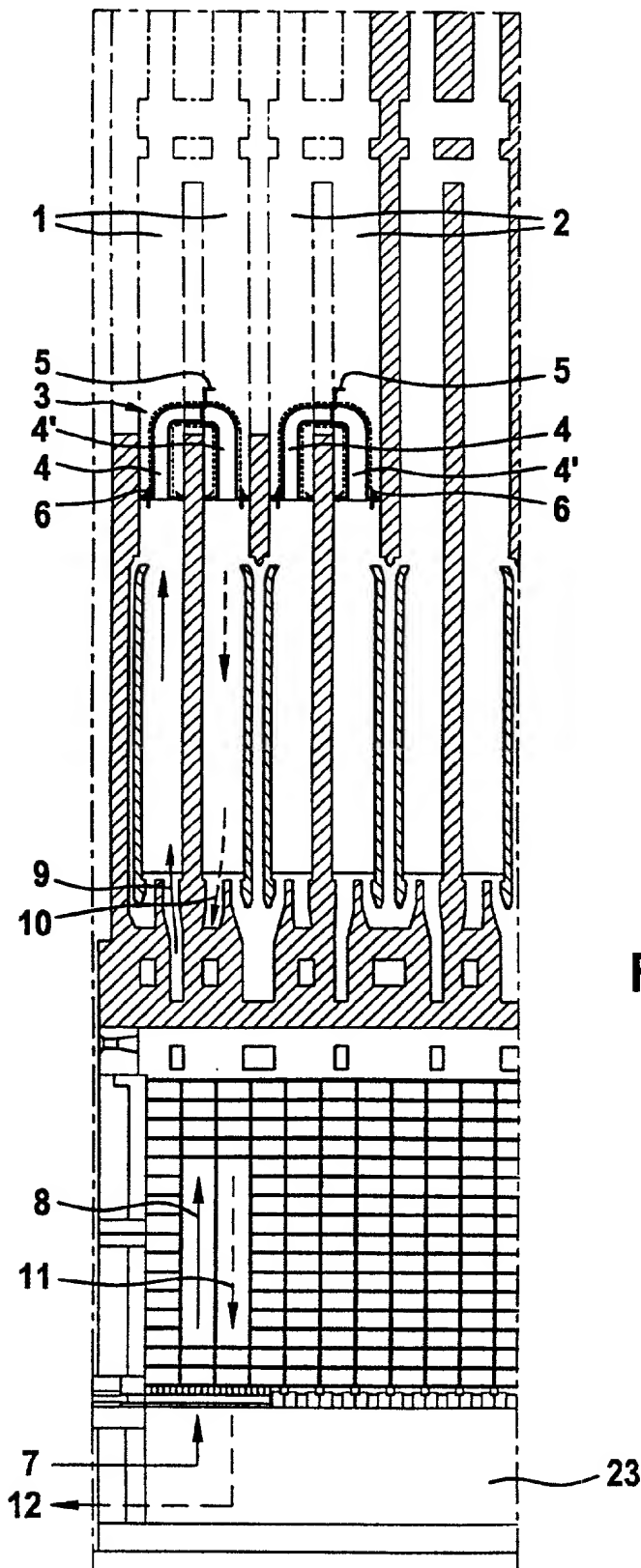


Fig. 1



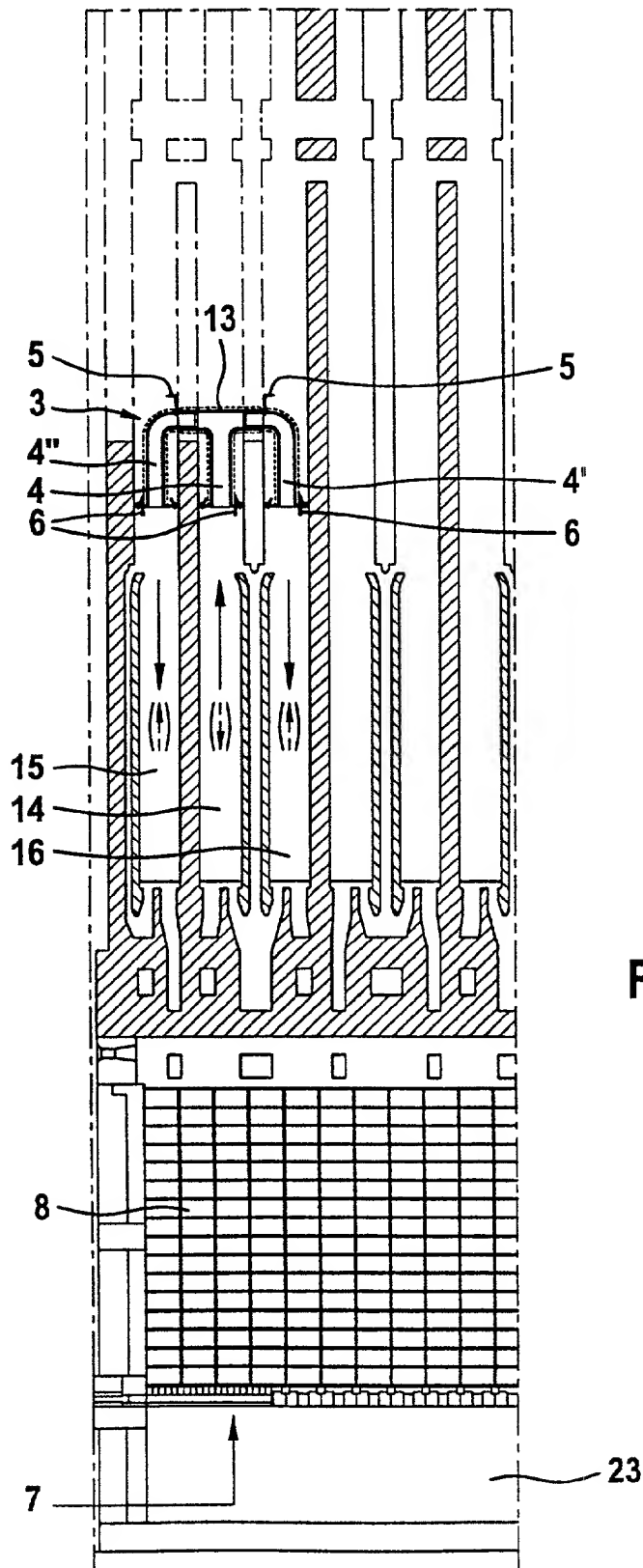
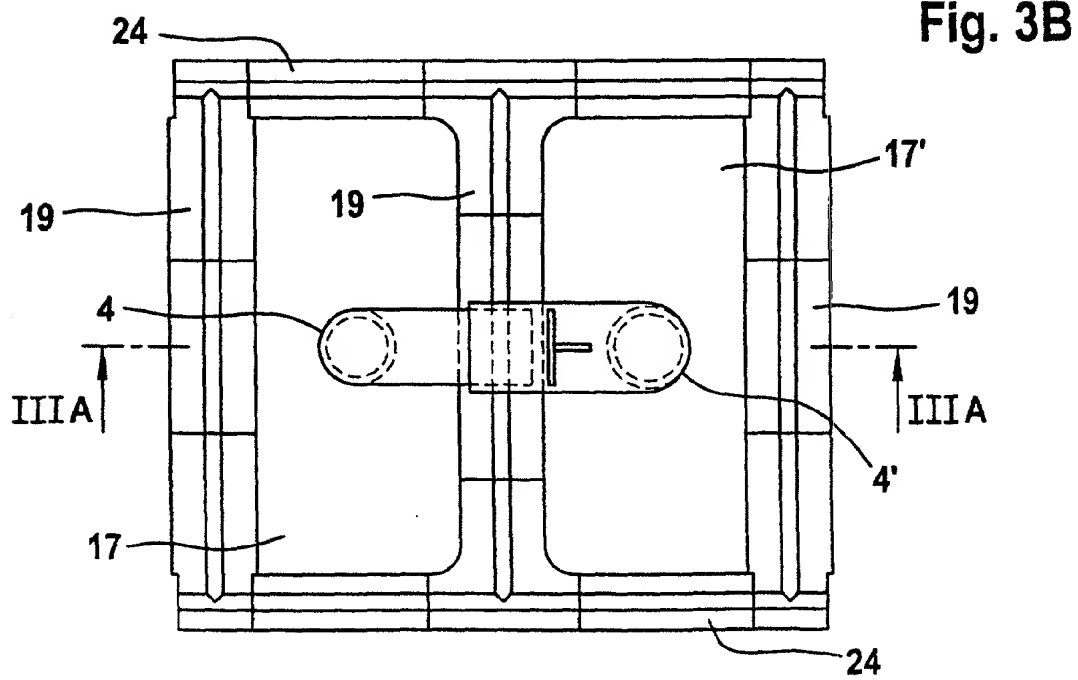
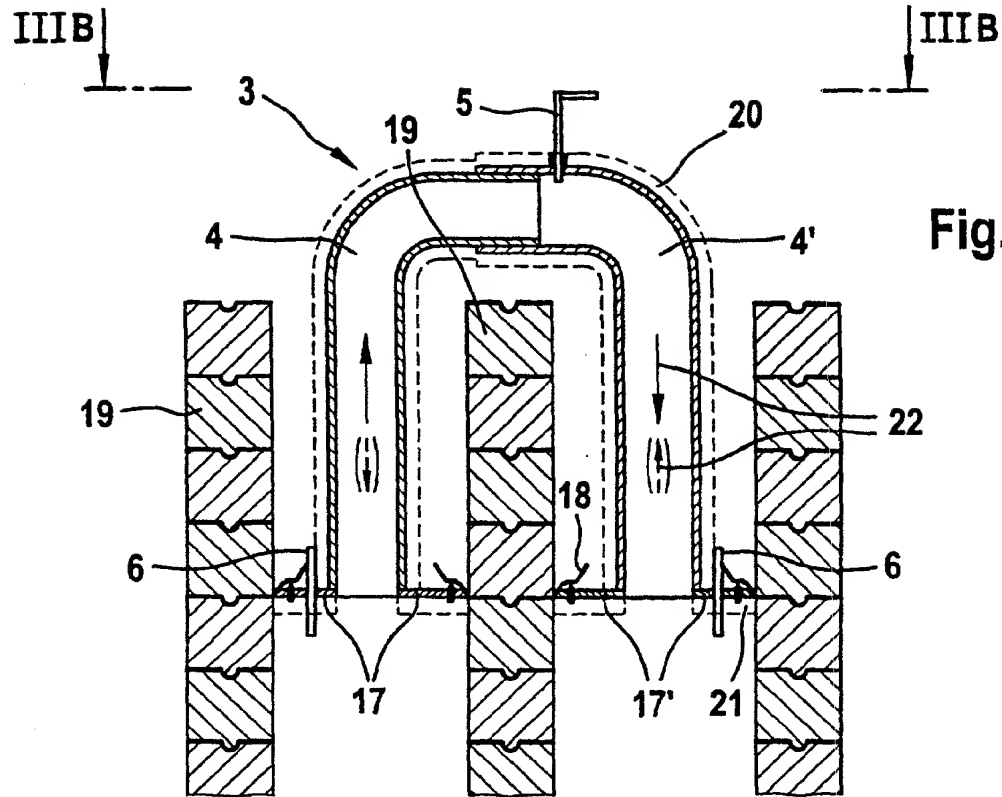


Fig. 2





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DECLARATION AND POWER OF ATTORNEY  
FOR PATENT APPLICATION/CONTINUATION-IN-PART PATENT APPLICATION

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated beneath my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

METHOD OF HOT-REPAIRING THE HEATING FLUES OF A COKE-OVEN BATTERY  
AND DEVICE FOR CARRYING OUT SAID METHOD

the specification of which

\_\_\_\_\_ is attached hereto.

X was filed on 8-23-2001 as Application Serial No. 09/414,326  
and was amended on \_\_\_\_\_.

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to patentability and/or examination of this application in accordance with Title 37, Code of Federal Regulations §1.56(a).

I hereby claim priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent, inventor's certificate or provisional application listed below, and I have also identified below any foreign application for patent, inventor's certificate or provisional application having a filing date before that of the application on which priority is claimed:

199 10 300.3 (German), filed March 9, 1999

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) listed below, and, insofar as the subject matter of each of the claims of this application/continuation-in-part application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §112. I acknowledge the duty to disclose information material to patentability as defined in Title 37, Code of Federal Regulations, §1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

<u>PCT/EP00/01998</u>	<u>March 8, 2000</u>	<u>Pending</u>
Application Serial No.	Filing Date	Status


_____	_____	_____
Application Serial No.	Filing Date	Status


I hereby appoint the firm of Vickers, Daniels & Young, Robert V. Vickers (Reg. No. 19,504), E. Kent Daniels, Jr. (Reg. No. 19,598), Thomas E. Young (Reg. No. 28,924), and Brian E. Turung (Reg. No. 35,394), 50 Public Square, Suite 2000, Cleveland, Ohio 44113-2235, to act jointly or severally as my attorneys, each with full power of substitution and revocation, to prosecute said application and to transact all business in the Patent and Trademark Office and/or all the competent international authorities in connection with an international application connected therewith.

And I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

  
\_\_\_\_\_  
WERNER HIPPE

  
\_\_\_\_\_  
HANS-JUERGEN FISCHER

Residence and ) Stargarder Strasse 11  
Post Office ) D-45968 Gladbeck  
Address ) GERMANY   
)

Residence and ) Wupperstrasse 45  
Post Office ) D-45219 Essen   
Address ) GERMANY  
)

Citizenship: German

Citizenship: German

Dated this 18. day of September, 2001

Dated this 18. day of September, 2001

(Sign)

(Print Name)

(Sign)

(Print Name)

Residence and )  
Post Office )  
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Citizenship:

Citizenship:

Dated this day of , 200\_

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